GARMIN Ltd. or its Subsidiaries, c/o Garmin International
1200 E 151st Street
Olathe KS 66062 USA

APPROVED
ROTORCRAFT FLIGHT MANUAL SUPPLEMENT
GARMIN G500H

As installed in

Robinson R44 II

Registration Number: _____ Serial Number: _____

This document serves as the Rotorcraft Flight Manual Supplement when the rotorcraft is equipped in accordance with Supplemental Type Certificate SR02206SE for the installation and operation of the Garmin G500H avionics display system in Robinson R44 II rotorcraft. This document must be carried in the rotorcraft at all times.

The information contained herein supplements or supersedes the information made available to the operator by the aircraft manufacturer in the form of placards markings, or an approved Rotorcraft Flight Manual, only in those areas listed herein. For limitations, procedures and performance information not contained in this document, consult the basic placards or markings, or the basic approved Rotorcraft Flight Manual.

FAA APPROVED

for - Manager, Flight Test Branch, ANM-160S
Federal Aviation Administration
Seattle Aircraft Certification Office
Transport Airplane Directorate

DATE: 1/05/2012

LOG OF REVISIONS				
	Page			
Revision Number	Date	No.	Description	FAA Approved
1 Original		All	Complete Supplement	Kevin F. Greene Mgr. Flt. Test Br., ANM-160S Federal Aviation Administration Seattle Aircraft Certification Office Transport Airplane Directorate Date: 1/05/2012

Table of Contents

SECTION 1. LIMITATIONS 5

1.1 TYPES OF OPERATION 5
1.2 COCKPIT REFERENCE & PILOT'S GUIDES 5
1.3 SYSTEM SOFTWARE REQUIREMENTS 5
1.4 DATABASES 6
1.5 AHRS OPERATIONAL AREA 6
1.6 AHRS OPERATION 6
1.7 MAXIMUM AIRSPEED 6
1.8 NAVIGATION ANGLE 6
1.9 HELICOPTER SYNTHETIC VISION TECHNOLOGY (HSVT) 6
1.10 TERRAIN AND OBSTACLE DISPLAY 6
1.11 TRAFFIC DISPLAY 7
1.12 EQUIPMENT REQUIREMENTS 7

SECTION 2. NORMAL PROCEDURES 8

2.1 PREFLIGHT 8
2.2 BEFORE TAKEOFF 8

SECTION 3. EMERGENCY AND MALFUNCTION PROCEDURES 9

3.1 EMERGENCY PROCEDURES 9
3.2 MALFUNCTION INDICATIONS AND PROCEDURES 9

SECTION 4. PERFORMANCE 15

GENERAL INFORMATION 16

GARMIN G500H FLIGHT DISPLAY SYSTEM 16
SYSTEM POWER SOURCES 17
PRIMARY FLIGHT DISPLAY 17
MULTIFUNCION DISPLAY 21
NAVIGATION SOURCES 22
AUDIO PANEL 22
INTERFACED EQUIPMENT 22
DATABASES 23

FAA APPROVED DATE: JAN 05 2012

SYSTEM BLOCK DIAGRAM..... 25
DEFINITIONS..... 26

Section 1. **LIMITATIONS**

1.1 **Types of Operation**

Rotorcraft equipped with the G500H Avionics Display System are limited to VFR ONLY.

1.2 **Cockpit Reference & Pilot's Guides**

Garmin G500H Cockpit Reference Guide P/N 190-01150-03, Revision A or later appropriate revision must be onboard the aircraft.

1.3 **System Software Requirements**

The G500H must utilize the following approved software versions for this Flight Manual Supplement to be valid:

Component	Identification	Software Version (or later approved)
GDU 620	PFD/MFD	6.01
GRS 77H	AHRS	3.52
GDC 74H	Air Data Computer	3.08
GMU 44	Magnetometer	2.01

Table 1-1 G500H Software Versions

In addition to the main components of the G500H the Garmin GPS/WAAS navigator interfaced to the G500H must utilize the following applicable software versions for this Flight Manual Supplement to be valid:

Component	Identification	Software Version (or later approved)
GNS 400W Series	GPS/WAAS NAV	4.01
GNS 500W Series	GPS/WAAS NAV	4.01
GNS 480/CNX80	GPS/WAAS NAV	2.2

Table 1-2 GNS Navigator Required Software Versions

1.4 Databases

Coverage of the terrain database is between North 75° latitude and South 60° latitude in all longitudes. Coverage of the obstacle database includes the United States and Europe. Detailed database coverage areas can be found at www.garmin.com.

1.5 AHRS Operational Area

The GRS 77 AHRS used in the G500H is limited in its operational area: AHRS Operation is not assured north of 72°N and south of 70°S latitudes. In addition, AHRS operation is not assured in the following four regions:

1) North of 65° North latitude between longitude 75° W and 120° W
2) North of 70° North latitude between longitude 70° W and 128° W
3) North of 70° North latitude between longitude 85° E and 114° E
4) South of 55° South latitude between longitude 120° E and 165° E

Loss of the G500H heading and attitude may occur in these regions.

1.6 AHRS Operation

When operating in no magnetometer or no magnetometer/no air data modes, rapid pitch or roll movements may result in temporary loss of attitude indication.

1.7 Maximum Airspeed

This rotorcraft was originally equipped only with a placard for determining maximum airspeed based on altitude; that placard remains as the means to determine maximum airspeed.

1.8 Navigation Angle

The Navigation Angle set in the GDU 620 must match that which is set on the GNS navigators (i.e. output in degrees MAGNETIC or TRUE).

1.9 Helicopter Synthetic Vision Technology (HSVT)

Helicopter Synthetic Vision Technology (HSVT) is for situational awareness ONLY. The use of the synthetic vision display as the primary means of aircraft control, navigation, or obstacle, terrain, or traffic avoidance is prohibited.

1.10 Terrain and Obstacle Display

Terrain and obstacle information is depicted for advisory purposes only and is not to be used as the primary means for aircraft maneuvers or navigation.

1.11 Traffic Display

The display of traffic is an aid to visual acquisition and is not to be utilized as the primary means for aircraft maneuvering.

1.12 Equipment Requirements

Table 1-3 below lists the minimum fully functional G500H System Elements required for VFR flight operations:

Equipment	Number installed	Number Required for Flight
Primary/Multi Function Display	1	1
Attitude / Heading Ref System (AHRS)	1	0
Air Data Computer (ADC)	1	1
Magnetometer (GMU)	1	0
Standby Altimeter	1	1
Magnetic Compass	1	1
GNS 400W, 500W, or 480 series navigator	1 or 2	0

Table 1-3 G500H Equipment Requirements

Section 2. **NORMAL PROCEDURES**

2.1 **Preflight**

Databases – Verify current (MFD system startup page)

2.2 **Before Takeoff**

MFD – Press Enter key

Data fields on the PFD – Verify valid and normal

System Messages – Considered

Section 3. **EMERGENCY AND MALFUNCTION PROCEDURES**

These procedures supersede those presented as markings or placards, or documented in the aircraft's FAA approved Rotorcraft Flight Manual as a result of the installation of the G500H system. All other emergency procedures remain in effect.

3.1 Emergency Procedures

3.1.1 Electrical Power Failur

In the event of a total loss of electrical power, the G500H system will cease to operate:

- Utilize standby instruments and visual references for aircraft control

3.2 Malfunction Indications and Procedures

3.2.1 Primary Flight Display Malfunction

Primary flight information (Heading, Altitude or Airspeed) on the PFD not available or invalid:

- Utilize standby instruments and visual references for aircraft control

3.2.2 AHRS Failure

A failure of the Attitude and Heading Reference System (AHRS) is indicated by a removal of the sky/ground presentation, a red X over the attitude indicator, and a yellow "ATTITUDE FAIL" shown on the PFD. A heading failure will also be indicated.

- Utilize visual references for aircraft control

- GPS Track – Utilize for heading if available

3.2.3 Heading Failure

A magnetometer failure is indicated by a HDG with a red X over it just to the left of the heading display. If the GDU 620 is still receiving valid GPS ground track from the GNS navigator, the heading will be replaced with GPS ground track in magenta. The aircraft can be flown by reference to GPS ground track instead of heading.

- GPS Track – Utilize for heading if available

A complete Heading Failure (magnetometer and GPS ground track failure) is indicated by the digital heading presentation being replaced with a red X and the compass rose digits being removed. The course pointer will indicate straight up and operate much like a traditional CDI, with the Omni-Bearing Selector being adjusted by the PFD knob set to CRS.

- Utilize standby compass.

3.2.4 Air Data Computer (ADC) Failure

Complete loss of the Air Data Computer is indicated by a red X over the airspeed, altimeter, vertical speed, TAS and OAT displays. Some derived functions, such as true airspeed and wind calculations, will also be lost.

- Utilize standby instruments and visual references.

3.2.5 Navigation

If navigation information on the PFD/MFD (HSI, Bearing Pointers, WPT bearing and distance information, or Moving Map Data) is not available or appears invalid:

- Select an alternate data source (via CDI key or 1-2 key)

- Utilize the data directly from the navigation equipment as required.

If GPS position information from the GPS WAAS navigator is not valid, the own-ship icon on the MFD is removed and "NO GPS POSITION" text is overlaid on the MFD moving map. The system will annunciate a loss of integrity, "LOI" on the HSI. The LOI annunciation will be colored yellow and the HSI needle will flag.

- Press the CDI or 1-2 soft key to select an alternate navigation source

3.2.6 Warnings, Cautions, and Advisory Annunciations

The following tables show the color and significance of the warning, caution, and advisory messages which may appear on the G500H displays.

NOTE

The G500H Cockpit Reference Guide and the G500H Pilot's Guide contain detailed descriptions of the annunciator system and all warnings, cautions and advisories.

Annunciation	*Pilot Action*	*Cause*
Red "X"	Utilize alternate equipment	A red X through any display field, indicates that display field is not receiving data or the data is corrupted.
TERRAIN	Visually acquire the terrain and avoid	HSVT Terrain has determined that nearby terrain poses a collision hazard.
OBSTACLE	Visually acquire the obstacle and avoid	HSVT Terrain has determined that a nearby obstacle poses a collision hazard.

Table 3-1 Warning Annunciations – Red

Annunciation	*Pilot Action*	*Cause*
ATTITUDE FAIL	Use visual references	Display system is not receiving attitude reference information from the AHRS; accompanied by the removal of sky/ground presentation and a red X over the attitude area.
AIRSPEED FAIL	Maintain flight attitude and power setting appropriate to target airspeed	Display system is not receiving airspeed input from the air data computer; accompanied by a red X through the airspeed display.
ALTITUDE FAIL	Use Standby Altimeter	Display system is not receiving altitude input from the air data computer; accompanied by a red X through the altimeter display.
VERT SPD FAIL	Cross check instruments	Display system is not receiving vertical speed input from the air data computer; accompanied by a red X through the vertical speed display.
HDG	Use Standby Magnetic Compass or GPS track information	Display system is not receiving valid heading input from the AHRS; accompanied by a red X through the digital heading display.
AHRS ALIGN – Keep Wings Level	Limit rotorcraft bank to less than 10 degrees as AHRS Aligns	Attitude and Heading Reference System is aligning. Keep attitude level using outside references. AHRS will not align if bank angle remains over 10 degrees.

Table 3-2 Caution Annunciations – Yellow

NO GPS POSITION	If the system is configured with dual GPS, press the 1-2 button	GPS data on the selected system is no longer valid. The Moving Map and associated data are not updating.
TRAFFIC	Visually acquire the traffic to see and avoid	The configured traffic system has determined that nearby traffic may be a threat to the aircraft.
NO TRAFFIC DATA	Use vigilance, as the traffic sensor is not detecting traffic	The configured traffic system is not able to detect traffic and / or provide the pilot with any traffic awareness.
TRFC FAIL	Use vigilance, as the traffic sensor may not be able to detect traffic	The configured traffic system may have failed.
TERRAIN	Visually acquire the terrain and avoid	HSVT Terrain has determined that nearby terrain may pose a collision hazard.
TER FAIL	Use vigilance as the HSVT Terrain will not provide terrain or obstacle alerts	HSVT Terrain has failed.
OBSTACLE	Visually acquire the obstacle and avoid	HSVT Terrain has determined that a nearby obstacle may pose a collision hazard.
WEATHER DATALINK FAILED	Use alternate source for weather data	The datalink for weather has failed.
NO DATA	Use alternate data source	Data is not available for display

Table 3-2 continued Caution Annunciations – Yellow

Annunciation	*Pilot Action*
Various Alert Messages may appear under the MFD - ALERTS soft key.	View and understand all advisory messages. Typically, they indicate communication issues within the G500H System. Refer to the G500H Cockpit Reference for appropriate pilot or service action.

Table 3-3 Advisories – White

Section 4. **PERFORMANCE**

No change.

GENERAL INFORMATION

Garmin G500H Flight Display System

The G500H Flight Display System consists of a Primary Flight Display (PFD) and Multi-Function Display (MFD) housed in a single Garmin Display Unit (GDU 620), an Air Data Computer (GDC 74H ADC) an Attitude and Heading Reference Systems (GRS 77H AHRS). The G500H interfaces with a Garmin GNS 400W, 500W, or 480 series GPS/WAAS navigator and an audio panel. Optionally, the G500H may interface with other systems installed in the rotorcraft including a Garmin GTX330 transponder, TAS traffic system, GDL 69(A) satellite data link, video sources, and GSR 56 Iridium data link.

Reference Garmin G500H PFD/MFD System Cockpit Reference Guide P/N 190-01150-03 for basic operational aspects of the system. For a complete detailed explanation of all the G500H's capabilities see the G500H Pilot's Guide P/N 190-01150-02.

The standby instruments (altimeter and magnetic compass) are completely independent from the PFD and will continue to operate in the event the PFD is inoperative. These standby instruments should be included in the pilot's normal instrument scan and must be utilized if the PFD data is in question.

System Power Sources

The G500H system depends on electrical power to function. The Garmin Display Unit (GDU), Attitude and Heading Reference System (AHRS), and Air Data Computer (ADC) are connected to the aircraft main bus.

The major components of the G500H are circuit breaker protected with reset-able type circuit breakers available to the pilot. These breakers are located on the circuit breaker panel forward of the left front seat and are labeled as follows:

Label	Unit Controlled
PFD	Garmin Display Unit (PFD/MFD), GDU 620
AHRS	Attitude and Heading Reference System, GRS 77H
ADC	Air Data Computer, GDC 74H

PRIMARY FLIGHT DISPLAY

The function of the PFD is to provide attitude, heading, air data and navigation information (from GNS units) to the pilot.

PFD Knob & PFD Soft Keys

The basic PFD controls are adjacent to and beneath the PFD display. The rotary knob performs the function annunciated on the display just to the upper left of the HSI: HDG, CRS, ALT, V/S, or BARO. If no function is annunciated, the knob is providing a HDG function. Assigning the function of the knob is done by pressing/releasing one of the dedicated function buttons adjacent to the PFD. The knob defaults back to HDG if it is not rotated for a period of 10 seconds. The Garmin G500H PFD/MFD System Cockpit Reference Guide describes each function and its operation.

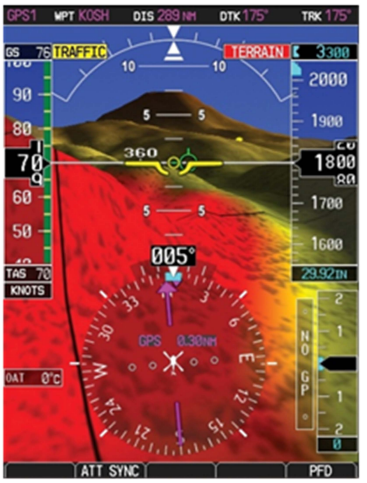
The soft keys at the bottom of the PFD display are used to configure the course data displayed in the HSI (CDI button, 1-2 button) and select the optional bearing pointers (BRG1 and BRG2 button) which may be overlaid in the HSI presentation on the PFD. The soft keys operate by press and release.

The ATT SYNC soft key synchronizes the miniature aircraft symbol to the horizon line at the time it is pressed. Pressing the soft key again will return the miniature aircraft symbol to its zero reference. When ATT SYNC is active small marks will appear at the outboard edges of the attitude display that show the zero pitch reference.

The units and markings on the PFD are not user configurable. They match the units as specified in the aircraft's FAA approved Rotorcraft Flight Manual and standby instruments. Display and control of the airspeed references are made via the AUX page of the MFD; consult the Garmin G500H Cockpit Reference Guide for description and operation of these references.

Helicopter Synthetic Vision Technology (HSVT) (Optional)

HSVT uses an internal terrain database and GPS location to present the pilot with a synthetic view of the terrain and obstacles in front of the aircraft. The purpose of the SVT system is to assist the pilot in maintaining situational awareness with regard to the terrain and traffic surrounding the aircraft. A typical HSVT display is shown below:



HSVT provides additional features on the G500H primary flight display (PFD) which include the following information:

- **Synthetic Terrain;** an artificial, database derived, three dimensional view of the terrain ahead of the aircraft within a field of view of approximately 25 degrees left and 25 degrees right of the aircraft heading.
- **Obstacles;** obstacles such as towers that are within the depicted synthetic terrain field of view.
- **Flight Path Marker (FPM);** an indication of the current lateral and vertical path of the aircraft. The FPM is displayed when synthetic terrain is selected for display and ground speed is more than 30 knots.
- **Horizon Line;** a white line indicating the true horizon is always displayed on the SVT display. The position of the terrain relative to the horizon line depends on aircraft altitude.
- **Horizon Heading;** a pilot selectable display of heading marks displayed just above the horizon line on the PFD.

- **Airport Signs**; pilot selectable "signposts" displayed on the synthetic terrain display indicating the position of nearby airports that are in the G500H database.
- **Runway Highlight**; a highlighted presentation of the location and orientation of the runway(s) at the destination airport.
- **Traffic (Optional)**; a display on the PFD indicating the position of other aircraft detected by a traffic system interfaced to the G500H system.

The synthetic terrain depiction displays an area approximating the view from the pilot's eye position when looking directly ahead of the pilot. Terrain features outside the field of view are not shown on the display.

The synthetic terrain display is intended to aid the pilot awareness of the terrain and obstacles in front of the aircraft. It may not provide either the accuracy or fidelity, or both, on which to solely base decisions and plan maneuvers to avoid terrain or obstacles. The synthetic vision elements are not intended to be used for primary aircraft control in place of the primary flight instruments.

The HSVT function may be turned on or off, as desired. To access the HSVT softkey menu, press the PFD softkey on the GDU 620, followed by the SYN VIS softkey. Synthetic vision terrain, horizon headings, and airport signs can be toggled on and off from this menu. Press the BACK softkey to return to the root PFD menu.

The synthetic vision display of terrain uses several data sources (GPS, terrain database, attitude information, etc.) in order to accurately display terrain. If any of these data sources become unreliable or unavailable, the display of synthetic terrain will automatically revert to the non-SVT PFD display of blue over brown. Additionally, if during the course of normal operations there is any discrepancy between actual terrain around the aircraft and terrain shown on the SVT display, the display of synthetic vision should be manually turned off.

HSVT Terrain

When the G500H has SVT enabled aural and visual terrain and obstacle alerting will be provided by the HSVT Terrain function of the G500H system. HSVT Terrain modes (normal, reduced protection (RP), and inhibit) can be selected via softkey on the Terrain page on the G500H MFD.

Altitude Alerter

The Altitude Bug Setting will flash when approaching within 1000 feet of the selected altitude, and an audio tone is played when approaching or deviating within 200 feet of the selected altitude.

MULTI FUNCTION DISPLAY

The primary function of the MFD is to display supplemental data including mapping, terrain, video, charts, and flight plan information.

MFD Knobs & MFD Soft Keys

The MFD controls are adjacent to and beneath the MFD display. The rotary knobs are used to scroll through various pages/page groups of the MFD. Pressing the knob will activate a cursor and allow for the user to enter data and manipulate settings.

Soft keys at the bottom of the display allow for the rapid selection of pre-defined functions to be performed on each page. The soft keys operate by pressing/releasing. More detailed configuration is typically available by pressing the MENU button, located on the right side of the display.

Pressing and holding down the CLR key for 2 seconds will display the main map page on the MFD. Details of the functions available on the MFD are explained in the Garmin G500H Cockpit Reference Guide.

NAVIGATION SOURCES

The G500H requires at least one Garmin GPS/WAAS navigation unit to be installed to ensure the integrity of the Attitude and Heading Reference System. The AHRS will still operate in reversionary mode if all GPS sources fail, and the PFD attitude display will still be presented.

The HSI on the G500H can display course deviation information from up to four sources: GPS 1, GPS 2, VLOC 1, or VLOC 2. In addition, the HSI can display two simultaneous bearing pointers sourced from GPS 1, GPS 2, VLOC 1, or VLOC 2.

AUDIO PANEL

If HSVT or a radar altimeter is installed the G500H Avionics Display System will be interfaced with the audio panel installed in the rotorcraft to provide aural altering generated by the G500.

INTERFACED EQUIPMENT

The G500H Flight Display System is approved to interface with other avionics systems including:

- TIS Traffic
- GDL 69 XM Data link
- Video
- GSR 56 Iridium Data link
- GNS 400W, 500W, or 480 Series Navigator
- Radar Altimeter

Traffic Display and Control (Optional)

The G500H Avionics Display System can display traffic from various sources including TIS data from the Garmin GTX Series Mode-S Transponders. The information from these systems is displayed on and controlled through the MFD.

XM Data link (Optional)

The G500H Avionics Display System can display weather data from a Garmin GDL69 or GDL69A XM satellite receiver. Graphical and textual weather information is displayed on and controlled through the MFD. If the G500H is interfaced to a Garmin GDL 69A XM satellite receiver then control of audio entertainment can be performed through the MFD.

Video Input (Optional)

The G500H Avionics Display System can display images from up to 2 video inputs. Video images are displayed on the MFD. The G500H does not provide a means to control the video source; however the digital images from the video source can be adjusted using the G500H.

Iridium Data link (Optional)

The G500H Avionics Display System can automatically report the rotorcraft position when interfaced with a Garmin GSR 56 Iridium Data link. Position reports are controlled through the MFD. The GSR 56 can also provide weather data for display on the MFD. Graphical and textual weather information is displayed on and controlled through the MFD.

Radar Altimeter (Optional)

The G500H Avionics Display System can display radar altitude on the PFD when interface with a radar altimeter. Minimums alerting is controlled by the pilot and provides an aural and visual alert upon descending to the selected altitude.

DATABASES

The G500H utilizes several databases. Database titles display in yellow if expired or in question (Note: the G500H receives the calendar date from the GPS, but only after acquiring a position fix.). Database cycle information is displayed at power up on the MFD screen, but more detailed information is available on the AUX pages. Internal database validation prevents incorrect data from being displayed.

The upper Secure Digital (SD) data card slot is typically vacant as it is used for software maintenance and navigational database updates. The lower data card slot should contain a data card with the system's terrain / obstacle information and optional data including Safe Taxi, FliteCharts and ChartView electronic charts.

The terrain databases are updated periodically and have no expiration date.

FAA APPROVED DATE:
JAN 05 2012

The obstacle database contains data for obstacles, such as towers, that pose a potential hazard to aircraft. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database. This database is updated on a 56-day cycle.

The Garmin SafeTaxi database contains detailed airport diagrams for selected airports. These diagrams aid in following air traffic control instructions by accurately displaying the aircraft position on the map in relation to taxiways, ramps, runways, terminals, and services. This database is updated on a 56-day cycle.

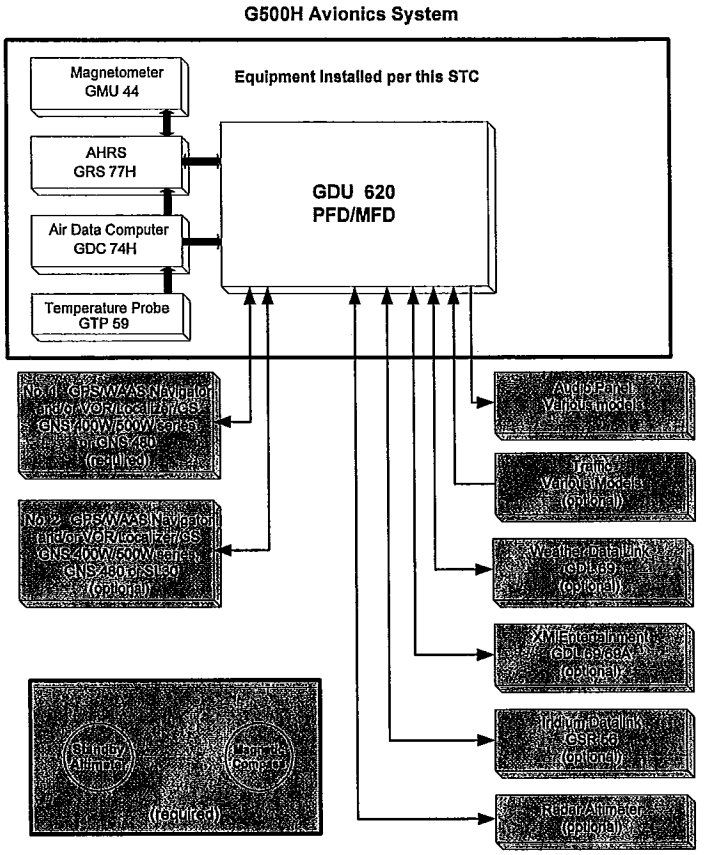
The Garmin FliteCharts database contains procedure charts for the coverage area purchased. This database is updated on a 28-day cycle. If not updated within 180 days of the expiration date, FliteCharts will no longer function.

The Jeppesen ChartView electronic charts database contains procedure charts for the coverage area purchased. An own-ship position icon will be displayed on these charts. This database is updated on a 14-day cycle. If not updated within 70 days of the expiration date, ChartView will no longer function.

PITOT-STATIC SYSTEM

The pitot-static system supplies air data to the GDC 74H and standby altimeter.

SYSTEM BLOCK DIAGRAM



DEFINITIONS

The following terminology is used within this document:

ADC:	Air Data Computer
AHRS:	Attitude & Heading Reference System
BARO:	Barometric Pressure
BRG:	Bearing
CDI:	Course Deviation Indicator
CRS:	Course
FPM:	Flight Path Marker
GDU:	Garmin Display Unit
GPS:	Global Positioning System
GSR:	Garmin Iridium Transceiver
HDG:	Heading
HSI:	Horizontal Situation Indicator
HSVT:	Helicopter Synthetic Vision Technology
ILS:	Instrument Landing System
LDA:	Localizer Directional Aid
LOC:	Localizer
LOC BC:	Localizer Backcourse
MFD:	Multi Function Display
PFD:	Primary Flight Display
RP:	Reduced Protection Mode
SD:	Secure Digital
SDF:	Simplified Directional Facility
TAS:	Traffic Awareness System
TIS:	Traffic Information Service

VFR:	Visual Flight Rules
VMC:	Visual Meteorological Conditions
V/S:	Vertical Speed
WAAS:	Wide Area Augmentation System